Beach erosion

Even beach erosion, a problem afflicting lake- and ocean-front communities throughout the world, can be abated through remote-sensing techniques.

As an example, some two miles of beach at Cape Canaveral that had been eroded by construction of a port and jetties was recently restored. Such work in harbors of many cities often disrupts the normal flow of sand for many miles along coasts.

An instrumented NASA airplane flew over the Canaveral coast approximately every three months providing color infrared photography. The pictures provided a measurable evaluation of the erosion before, during, and after project completion. It enabled the beach restorers to pinpoint areas of critical concern and shoreline instability so they could plan interim corrections.

Brevard County Fla. residents now enjoy a 400-ft wide public beach in an area in imminent danger of destructive erosion just a year previously. Before (left) and after (right) aerial photos show how more than two miles of beach were rebuilt with 2.7 million cubic yards of sand, helping abate the erosion problem caused by construction of jetties at Port Canaveral in the early 1960s. NASA volunteered its remote-sensing technology and instrumented aircraft to provide low-altitude color infrared photography about every three months since 1972. Photo at right also shows Trident submarine basin built between April 1974 and January 1975 when these two views were taken.

The photos also highlighted sand dunes that had been altered by construction and showed how they contributed to the beach erosion. Such encroachments of the dunes now have been restricted by local laws.

The restoration project is one of many examples of how aerospace technology can help solve community problems.

Exploring with gravity

Among oil and mineral prospecting tools are instruments that measure anomalies in the gravitational and related fields. The instruments work because the density of hydrocarbon-bearing rock or ore deposits is different from that of normal soil.

Modern gravity meters actually can achieve an accuracy of up to one part in a 100-million, but only on the earth's surface using a complicated system of springs and levers that require extreme dismensional stability and tedious data interpretation.

Sponsored by the Technology Utilization Office, the Langley Research Center last year undertook a six-month feasibility study to adapt a sensitive resonance fluorescence spectrometer as a gravitometer. The spectrometer was improved initially by Langley to investigate small changes in the atomic composition of spacecraft metals that might cause structural fatigue. Results of the study indicated that such a device could detect gravitational anomalies from the air with sufficient accuracy to reveal mineral and oil resources.

The starting point of such an instrument is high-purity rhodium, free from magnetic and other impurities. Thus, research is proceeding this year to grow or otherwise purify source-absorber rhodium crystals of the required perfection.